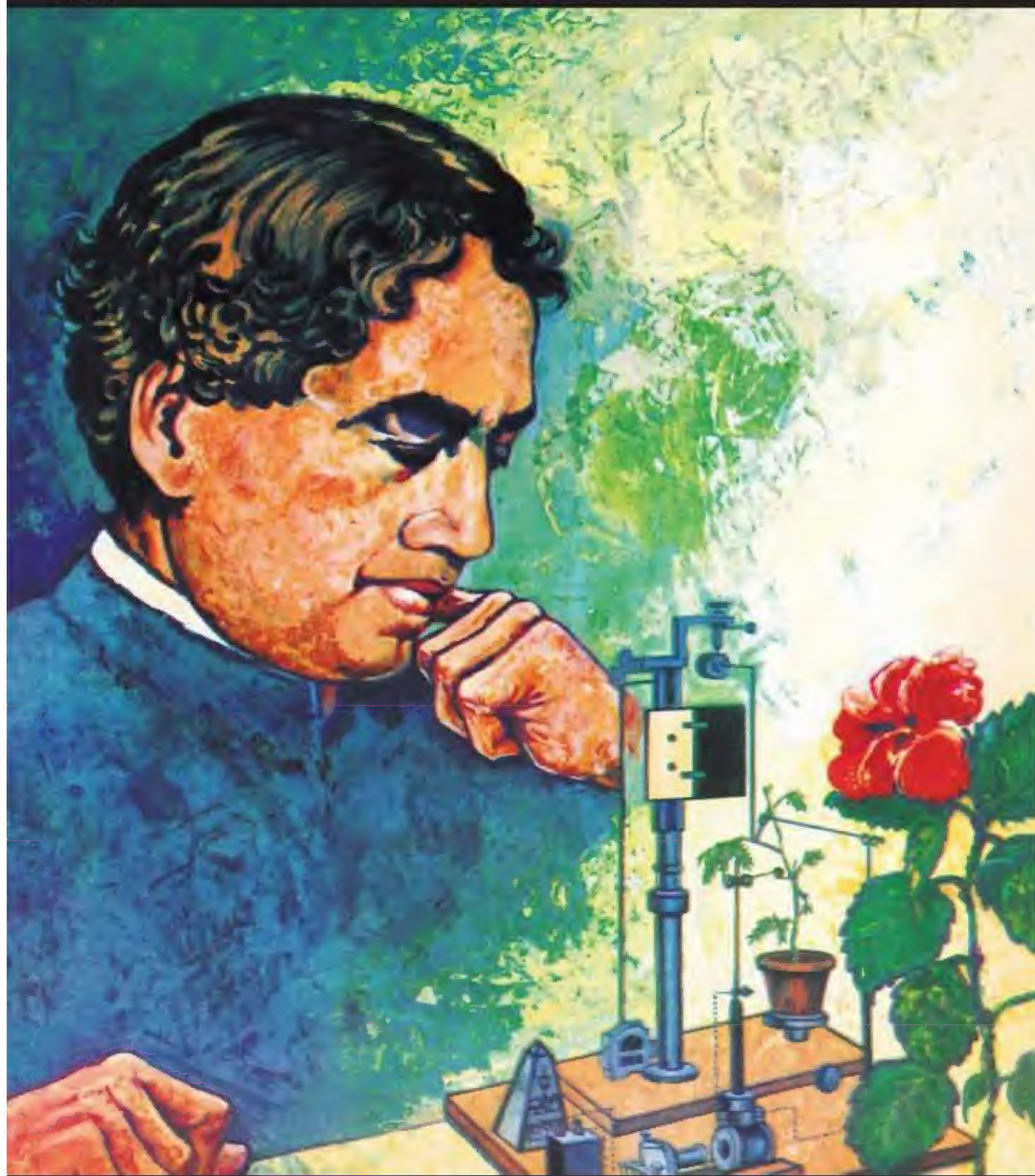




# JAGADIS CHANDRA BOSE

THE SCIENTIST WHO BEFRIENDED PLANTS AND METALS

Vol 699





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# JAGADIS CHANDRA BOSE



1862, FARIDPUR : A BOY OF FOUR LOOKED UP AT THE SKY ...

... AND TURNED TO HIS FATHER.

BABA, I SAW SO MANY STARS IN THE SKY LAST NIGHT. BUT NOW THEY ARE GONE.



WHERE HAVE THEY GONE, BABA?



THEY HAVEN'T GONE ANYWHERE, SON. WE CANNOT SEE THEM BECAUSE THE SUN'S LIGHT IS BRIGHTER.



BABA, WHY ARE PLANTS ALL GREEN? BIRDS AND ANIMALS HAVE SO MANY COLOURS.

TO TELL YOU THE TRUTH, I DON'T KNOW.



WHEN YOU GROW OLDER TRY TO FIND OUT WHY.

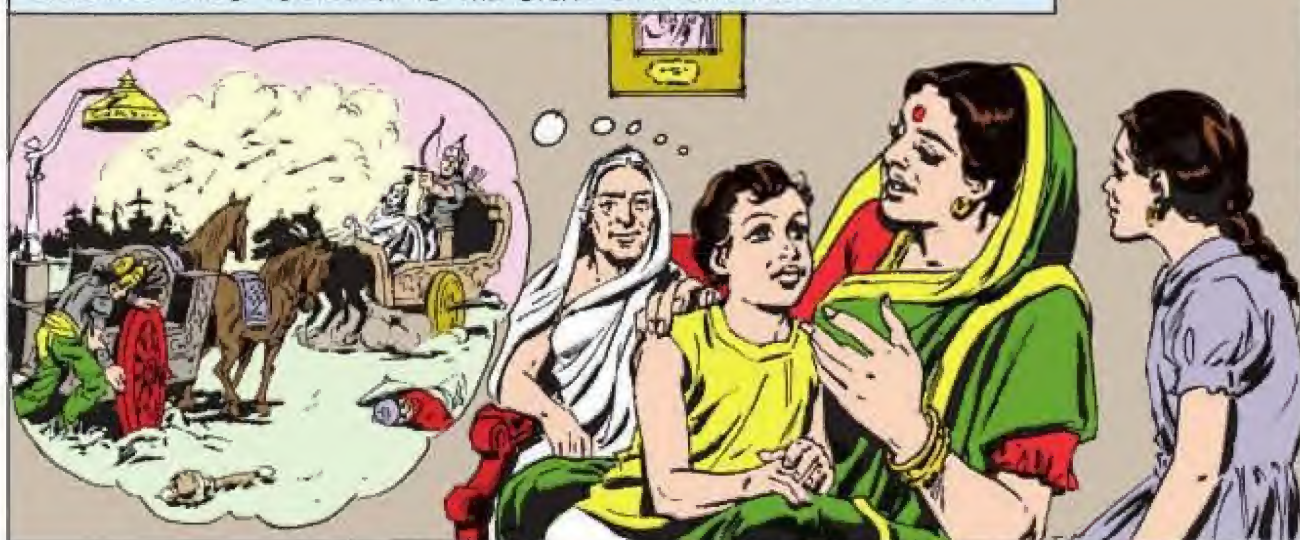
THE BOY WHO ASKED QUESTIONS WAS JAGADIS CHANDRA BOSE WHO LATER BECAME THE FIRST INDIAN IN MODERN TIMES TO WIN INTERNATIONAL ACCLAIM AS A SCIENTIST.



JAGADIS'S MOTHER, BAMASUNDARI, WAS A TRADITIONAL HINDU WIFE AND A LOVING BUT STRICT MOTHER.



JAGADIS LIKED TO LISTEN TO THE STORY OF KARNA AGAIN AND AGAIN.



WHEN THE STORY-TELLING WAS OVER, BAMASUNDARI ASKED HIM THE USUAL QUESTION.





JAGADIS' FATHER, BHAGWAN CHANDRA BOSE, WAS THE DEPUTY MAGISTRATE OF FARIDPUR. HE WAS A GREAT LOVER OF SPORT.

NOW ISN'T THAT  
A TOUGH JOB FOR  
A FIVE-YEAR-  
OLD? WHY DO  
YOU LET HIM  
DO IT?

A LITTLE STRENUOUS  
EXERCISE IS GOOD FOR  
A GROWING BOY'S LIMBS.



LOOK! HE'S  
MOUNTING THE  
PONY! HE'LL FALL  
OFF!



YOUR SON, IS  
SMART... JUST LIKE  
AN ENGLISH BOY!

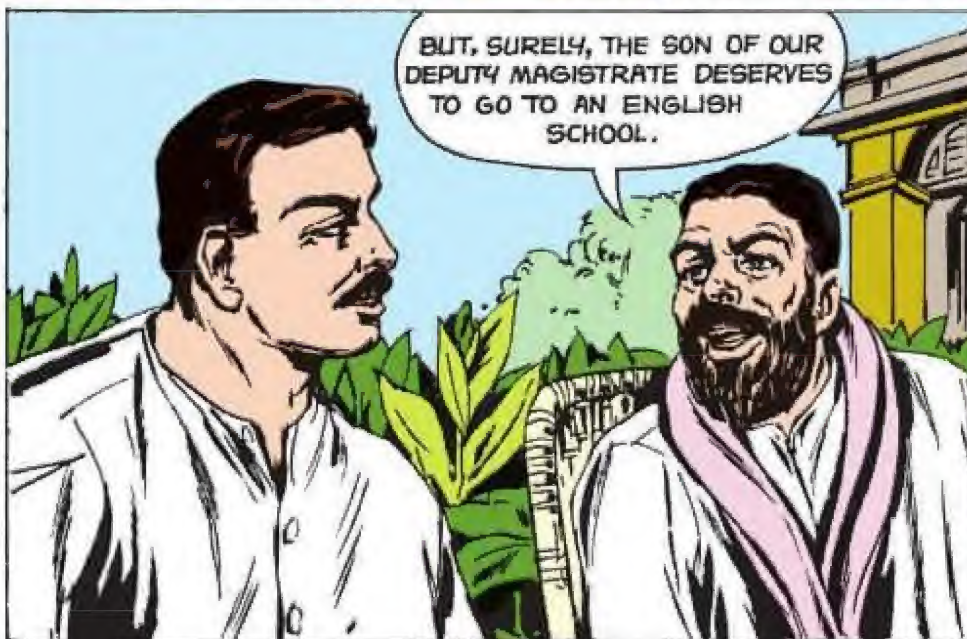
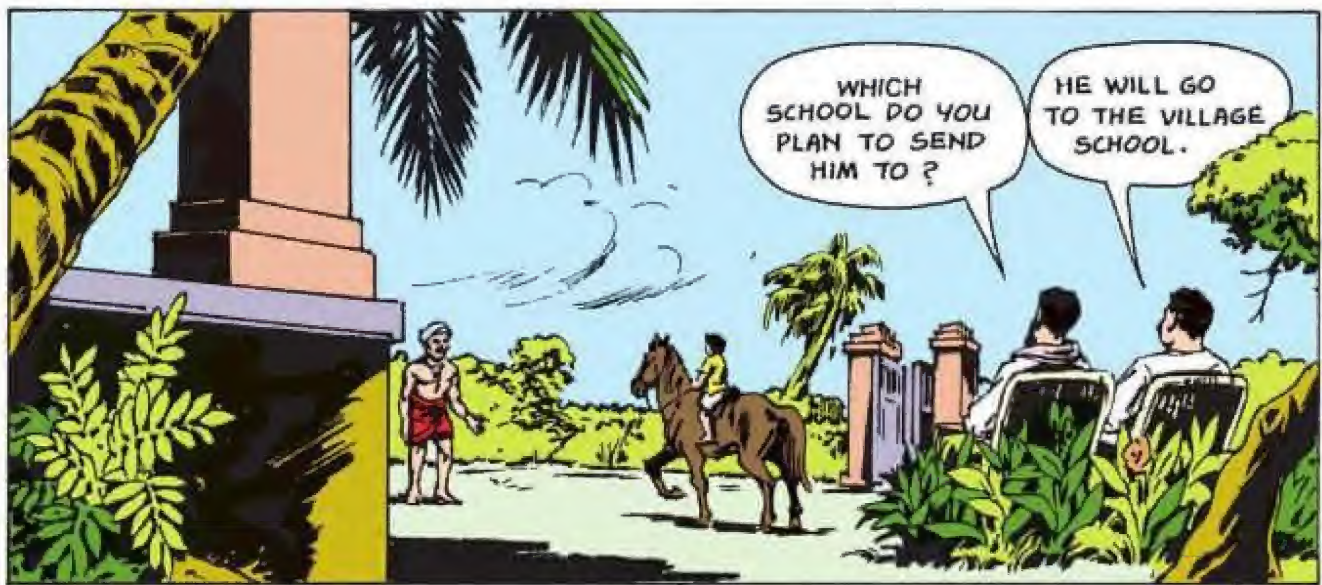


BHAGWAN CHANDRA GENTLY CORRECTED  
HIS FRIEND.

HE IS SMART LIKE  
ANY OTHER  
INDIAN BOY.









WHILE OTHER CHILDREN WERE CONTENT WITH SCHOOL WORK, JAGADIS, EVER CURIOUS ABOUT NATURE, WAS ALWAYS RUNNING OFF TO GAZE AT THE FIELDS, THE WOODS, THE RIVER.



IS THE PLANT GREEN ALL THROUGH?



OH! IT'S GREEN ONLY TILL THE ROOTS THEN IT STOPS BEING GREEN. I WONDER WHY.



WHAT A BEAUTIFUL CREATURE! I'LL CATCH IT FOR THE POND IN MY GARDEN.



SOON —

JAGADIS WHERE HAVE YOU... E-E-E-E-K!

I CAUGHT IT.



IT'LL BITE YOU. IT'S POISONOUS.

IT ISN'T! THAT'S WHY IT'S MY PET NOW!



THROUGHOUT HIS LIFE JAGADIS LOVED ANIMALS AND BIRDS. TILL HE WENT UP TO COLLEGE HIS PETS RANGED FROM SNAKES AND FROGS TO SHEEP!



WHEN JAGADIS WAS TEN, HIS FATHER WAS TRANSFERRED TO BURDWAN AS AN ASSISTANT COMMISSIONER.

BAMASUNDARI, I HAVE DECIDED THAT JAGADIS SHOULD NOW GO TO AN ENGLISH SCHOOL AT CALCUTTA. HOSTEL LIFE WILL MAKE HIM SELF-RELIANT AND STRONG.



THE CHANGE FROM THE COSY WARMTH OF HIS TRADITIONAL INDIAN HOME TO A HOSTEL OF BLUNT, BOISTEROUS STUDENTS MADE JAGADIS MISERABLE AND HOMESICK.



THE FIRST FEW DAYS AT SCHOOL WERE PARTICULARLY BAD FOR THE SENSITIVE BOY. HE DID NOT KNOW WESTERN MANNERS AND HE COULD BARELY SPEAK ENGLISH.



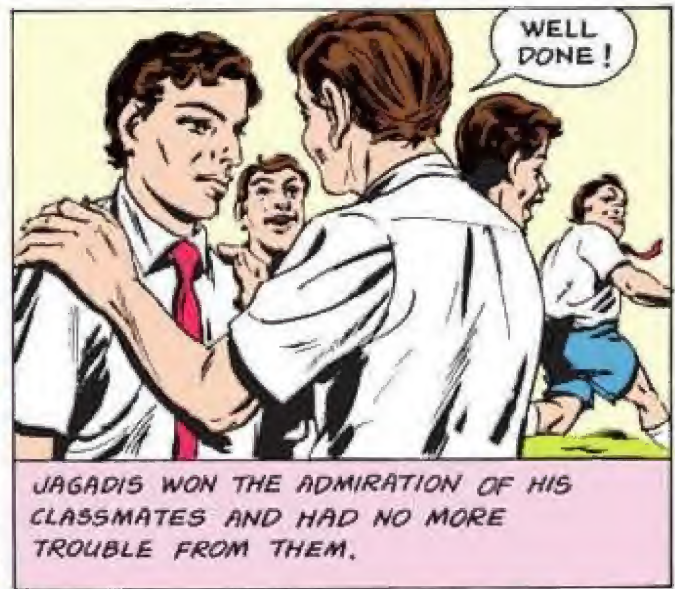
LOOK AT THAT COUNTRY BUMPKIN.

YEARNING FOR HIS COWS NO DOUBT.

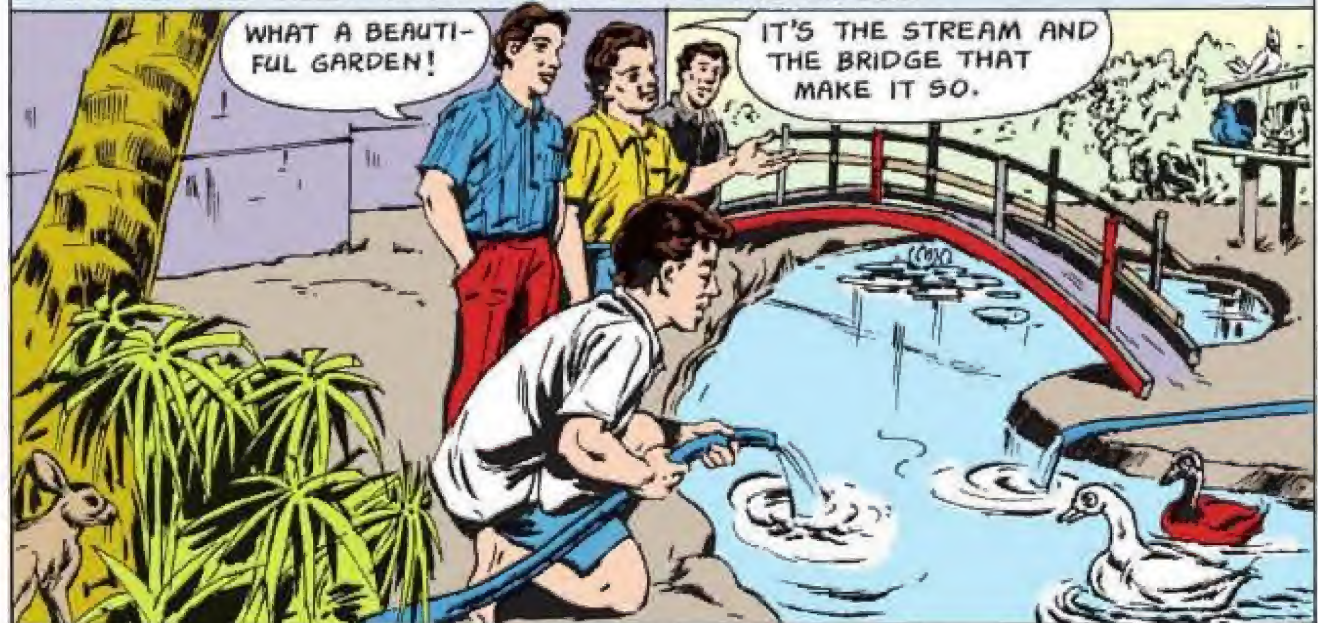








OVER THE NEXT FEW WEEKS HE MADE A GARDEN IN THE HOSTEL, COLLECTED A FEW PETS AND SOON BEGAN TO ENJOY SCHOOL AND HOSTEL LIFE.





AT THE END OF TERM JAGADIS RETURNED HOME TO BURDWAN FOR HIS HOLIDAYS.

WHAT'S THAT, FATHER?

IT'S A WORKSHOP.



WHEN YOU WERE AWAY AT SCHOOL, A MALARIA EPIDEMIC BROKE OUT HERE. MANY CHILDREN LOST THEIR PARENTS.



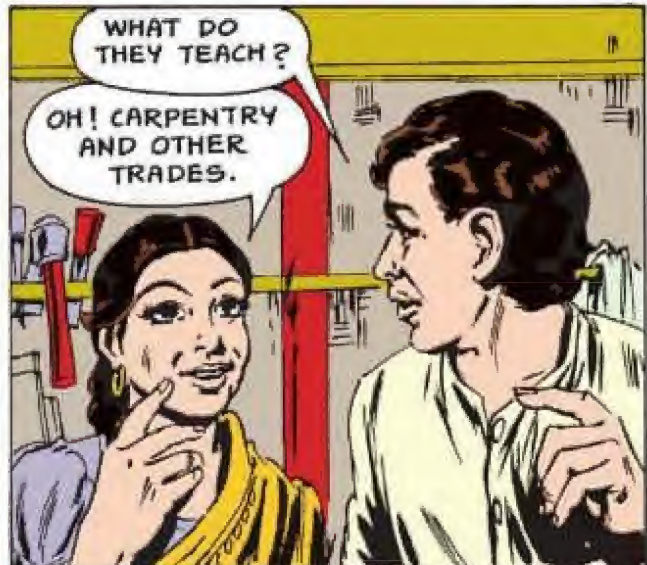
FATHER STARTED THIS WORKSHOP TO HELP THOSE CHILDREN LEARN SOME TRADE AND STAND ON THEIR OWN FEET.

WHAT FUN!



WHAT DO THEY TEACH?

OH! CARPENTRY AND OTHER TRADES.



JAGADIS STARTED SPENDING MOST OF HIS TIME IN THE WORKSHOP.

PLEASE SHOW ME HOW TO DRILL HOLES IN THIS METAL.

YOU HAVE TO HOLD THE DRILL FIRMLY AND TURN THE HANDLE LIKE THIS.



BUT WHAT FASCINATED HIM MOST WAS THE FOUNDRY.

CAN YOU MELT ANY METAL IN THAT FURNACE?

ANY METAL, JAGADIS BABU.

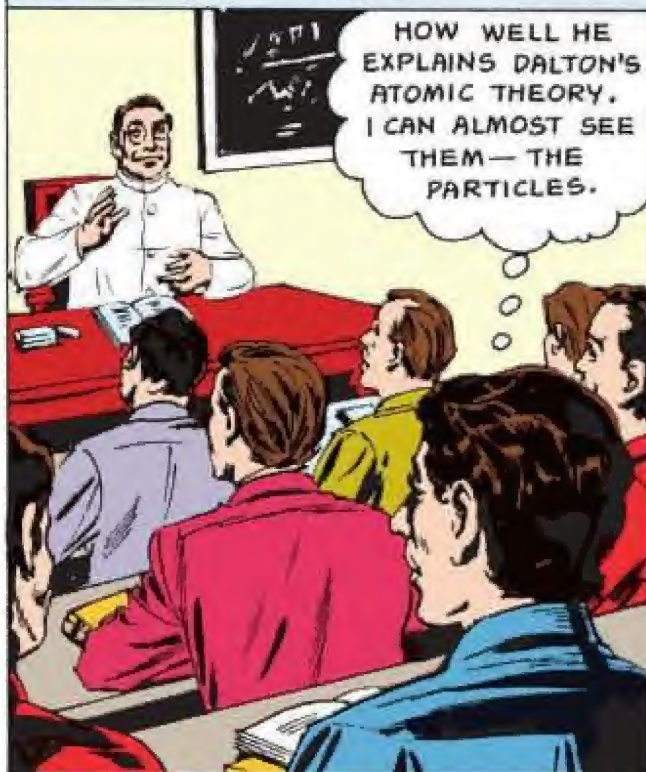








JAGADIS FINISHED SCHOOL AT SIXTEEN AND JOINED ST. XAVIER'S COLLEGE. THERE HE FELL UNDER THE SPELL OF FR. LAFONT, THE RECTOR OF THE COLLEGE AND THE BEST PROFESSOR OF PHYSICS IN INDIA IN THOSE DAYS.



HOW WELL HE EXPLAINS DALTON'S ATOMIC THEORY. I CAN ALMOST SEE THEM — THE PARTICLES.



HOW SKILFUL HE IS WITH THE EXPERIMENT! I WOULD GIVE ANYTHING TO BE A SCIENTIST LIKE HIM.

FR. LAFONT ON HIS PART SAW GREAT PROMISE IN HIS STUDENT AND ENCOURAGED HIM IN THE STUDY OF PHYSICS.

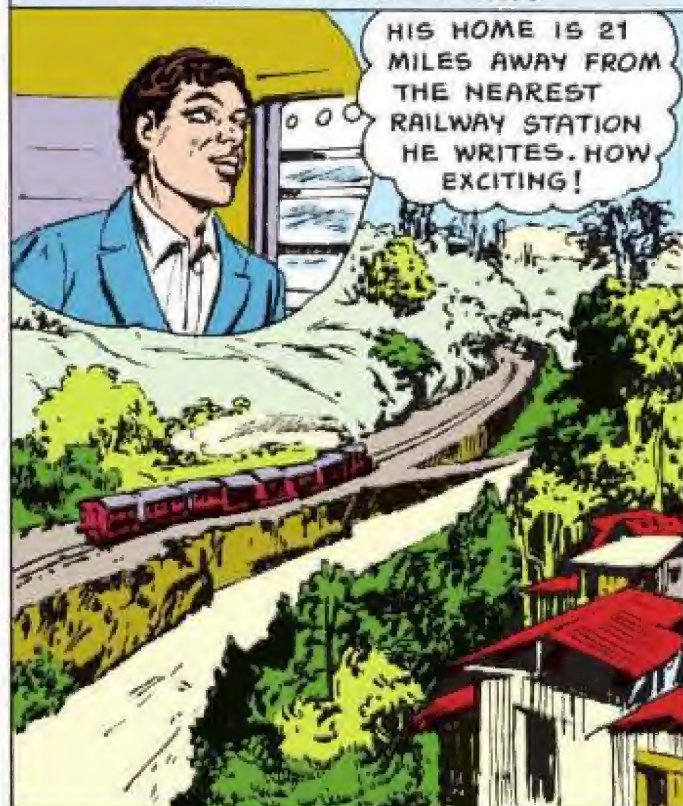
THREE DELIGHTFUL YEARS OF COLLEGE FLEW PAST. THEN AT THE END OF TERM —



I SAY, JAGADIS, WHY DON'T YOU SPEND THE VACATION WITH ME IN THE TERAI FOREST? WE'LL TEACH YOU TO SHOOT BIG GAME.

JAGADIS ACCEPTED THE INVITATION AND CAME BACK AN EXPERT IN BIG-GAME HUNTING AND WITH A MILLION SAND-FLY BITES!

WHEN THE NEXT VACATION CAME ROUND, ANOTHER FRIEND INVITED HIM, TO ASSAM THIS TIME, FOR THE SAME SPORT.



HIS HOME IS 21 MILES AWAY FROM THE NEAREST RAILWAY STATION HE WRITES. HOW EXCITING!

\* ABOUT 34 KM.



ALIGHTING AT THE ASSAM RAILWAY STATION HE HAD TO TRAVEL OVERNIGHT BY PALANQUIN TO REACH HIS FRIEND'S HOUSE.



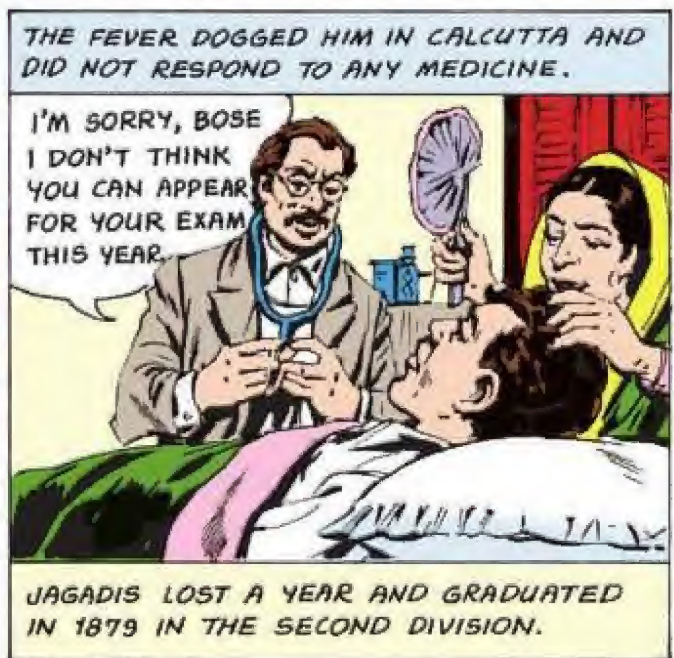
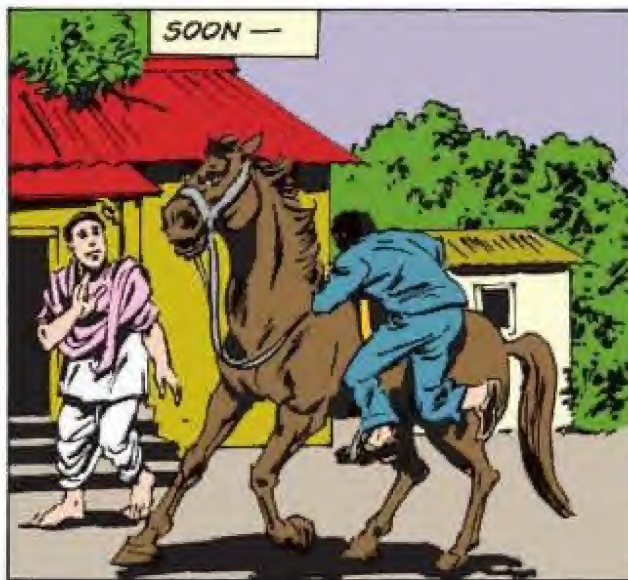
AS SOON AS HE REACHED, HE AND HIS FRIEND LEFT FOR THE FORESTS AND SPENT THE WHOLE DAY THERE.



THAT EVENING —

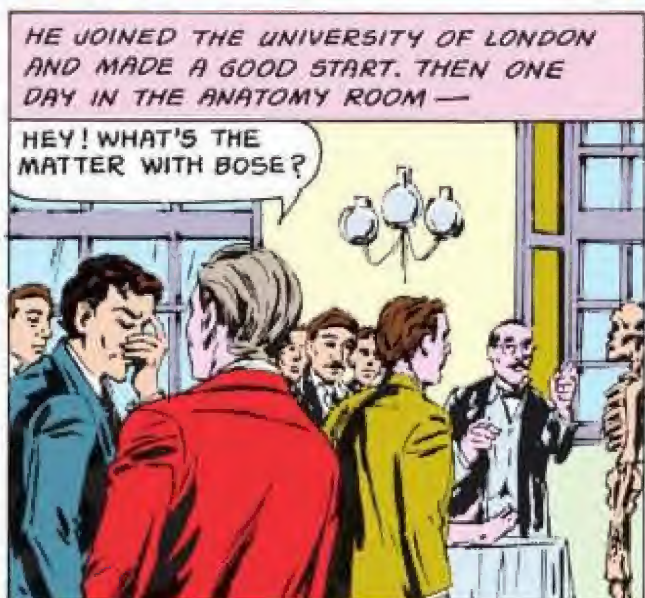
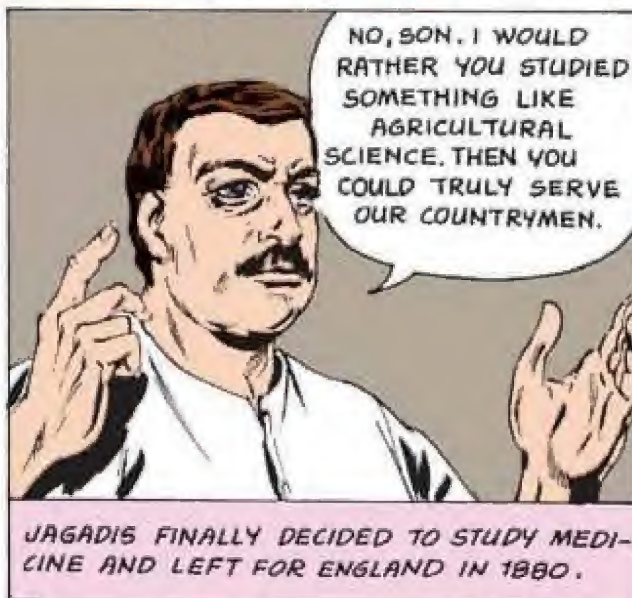






JAGADIS LOST A YEAR AND GRADUATED IN 1879 IN THE SECOND DIVISION.







WHEN HE TRIED TO DO WORK AGAIN IN THE ANATOMY ROOM, HOWEVER, HIS FEVER RECURRED. AT LAST —

MR. BOSE, I'M SORRY BUT I'M AFRAID YOU'LL HAVE TO GIVE UP THE STUDY OF MEDICINE. YOU ARE ALLERGIC TO THE ODOURS OF THE ANATOMY LAB.



SO BOSE GAVE UP MEDICINE AND TOOK UP THE NATURAL SCIENCE COURSE AT CAMBRIDGE. HIS PHYSICS PROFESSOR THERE WAS LORD RAYLEIGH, A LEADING SCIENTIST OF THE TIMES.

HOW FASCINATING IS THE WORLD OF ENERGY AND MATTER AND THEIR INTERACTION! AND PROF. RAYLEIGH MAKES IT ALL SOUND SO SIMPLE AND CLEAR.



HE HAS THE SAME APPROACH TO THE SUBJECT AS FR. LAFONT.



AT CAMBRIDGE HIS FEVER VANISHED AND NEVER AGAIN TROUBLED HIM.

HE TOOK HIS DEGREE (TRIPOS) IN THE NATURAL SCIENCES IN 1884 WITH PHYSICS, CHEMISTRY AND BOTANY...



... AND SIMULTANEOUSLY TOOK A B.Sc. DEGREE FROM THE UNIVERSITY OF LONDON AS IT DID NOT REQUIRE ANY EXTRA WORK.



HE RETURNED TO INDIA AND FOUND THAT HIS FATHER HAD MADE SOME MISCALCULATIONS AND RUN UP HUGE DEBTS.

I MUST SEEK SOME EMPLOYMENT AND HELP FATHER OUT.



IN 1885, BOSE SECURED THE POST OF PROFESSOR OF PHYSICS AT PRESIDENCY COLLEGE IN CALCUTTA.



BUT SOMETHING HE DISCOVERED ONLY LATER MADE HIM VERY UNHAPPY.

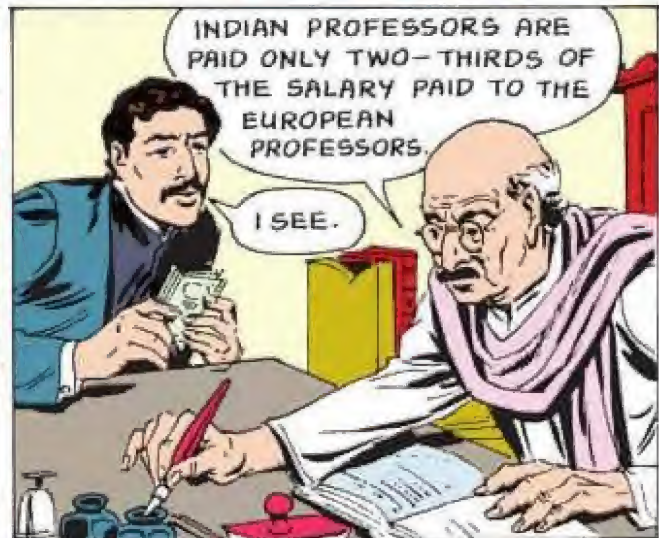
HAVEN'T YOU MADE A MISTAKE?

NO, BABU, I HAVEN'T.



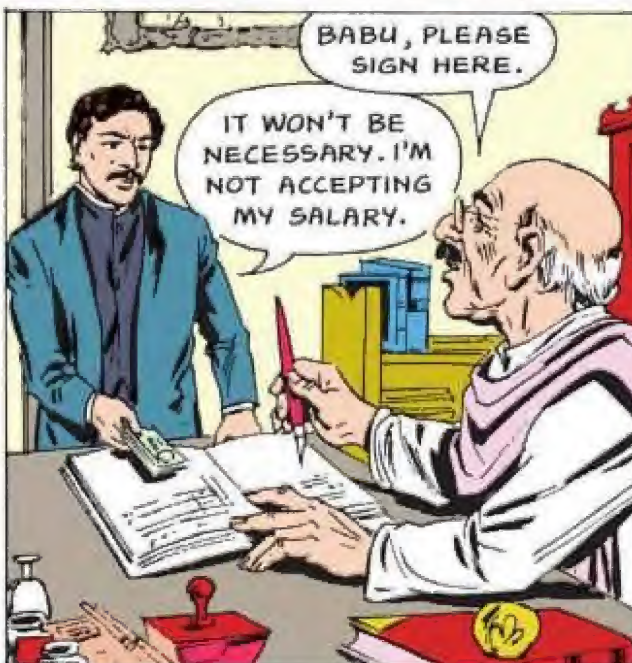
INDIAN PROFESSORS ARE PAID ONLY TWO-THIRDS OF THE SALARY PAID TO THE EUROPEAN PROFESSORS.

I SEE.



BABU, PLEASE SIGN HERE.

IT WON'T BE NECESSARY. I'M NOT ACCEPTING MY SALARY.



BABU!





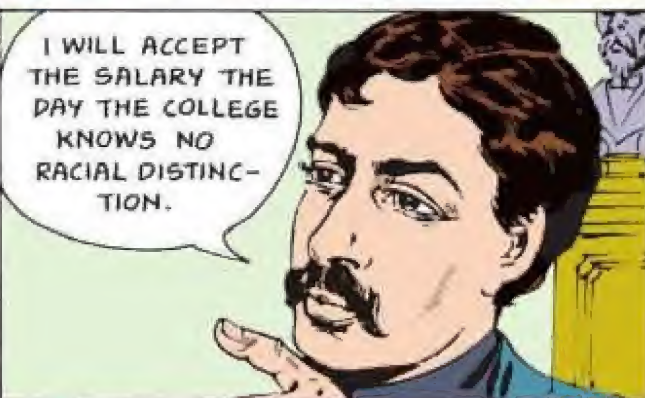
PROF. BOSE'S THEN NOVEL WAY OF PROTESTING PERPLEXED HIS COLLEAGUES.

YOU CONTINUE TO TEACH BUT REFUSE THE SALARY. ISN'T IT FOOLISH ?

IT IS A MATTER OF HONOUR TO TEACH AT THIS COLLEGE. SO I TEACH.



WHAT I OBJECT TO IS DISPARITY IN PAY ON RACIAL GROUNDS.

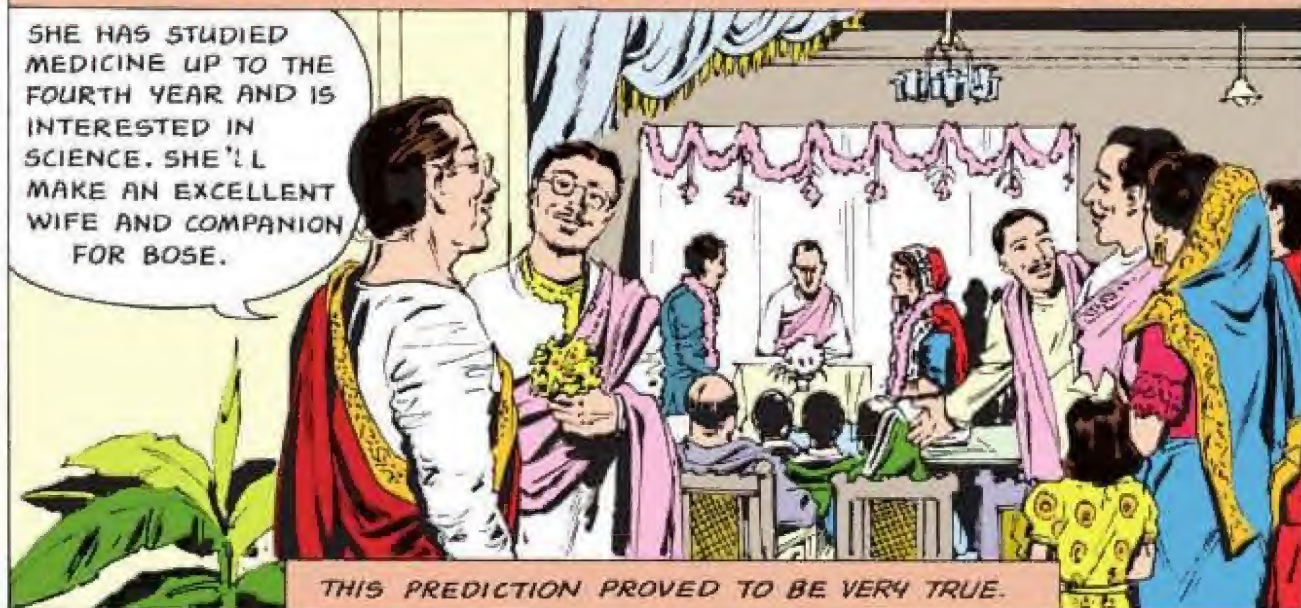


I WILL ACCEPT THE SALARY THE DAY THE COLLEGE KNOWS NO RACIAL DISTINCTION.

SO, THOUGH HE NEEDED THE MONEY, BOSE REFUSED THE SALARY. INSTEAD HE SOLD SOME OF THE FAMILY'S ANCESTRAL PROPERTY TO REPAY HIS FATHER'S DEBTS.

IN 1887 BOSE WAS MARRIED TO ABALA, THE DAUGHTER OF BHAGWAN CHANDRA'S FRIEND.

SHE HAS STUDIED MEDICINE UP TO THE FOURTH YEAR AND IS INTERESTED IN SCIENCE. SHE'LL MAKE AN EXCELLENT WIFE AND COMPANION FOR BOSE.



THIS PREDICTION PROVED TO BE VERY TRUE.



MEANWHILE BOSE WAS GETTING TO BE POPULAR WITH THE STUDENTS.

COME ON, LET'S HURRY. IT'S PROF. BOSE'S CLASS. WE WON'T BE ABLE TO SIT IN THE FIRST ROW IF WE ARE LATE.



THOUGH IT TOOK THREE YEARS, BOSE'S PROTEST FINALLY MADE ITS IMPACT AND A COMMON PAY SCALE WAS INTRODUCED.

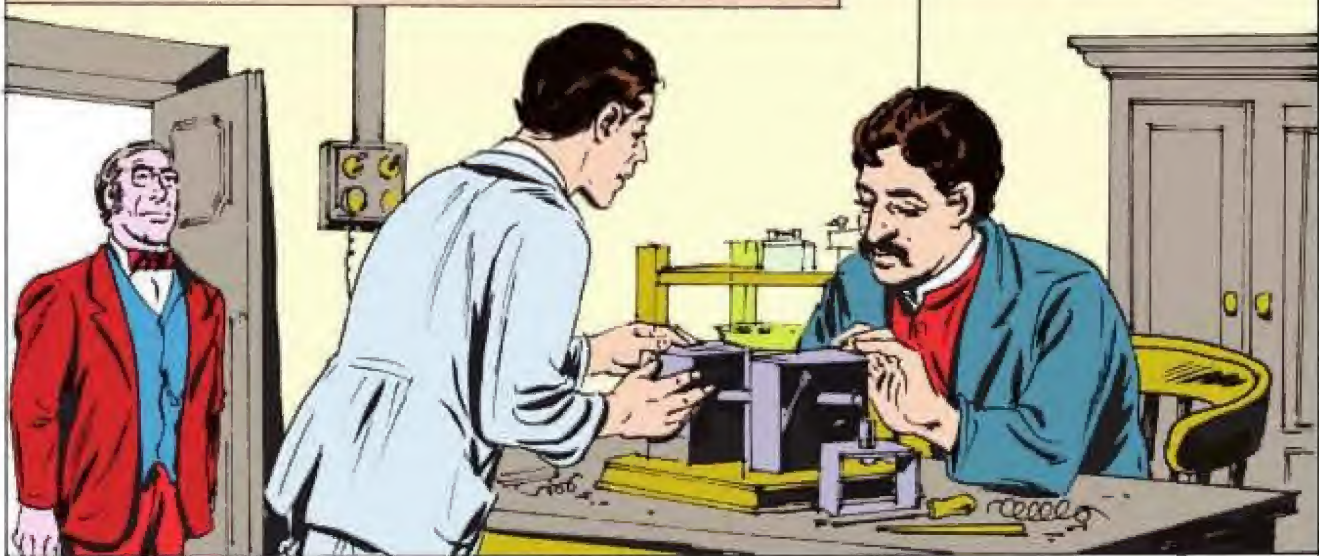
BOSE! YOU HAVE WON! CONGRATULATIONS.

THANK YOU.



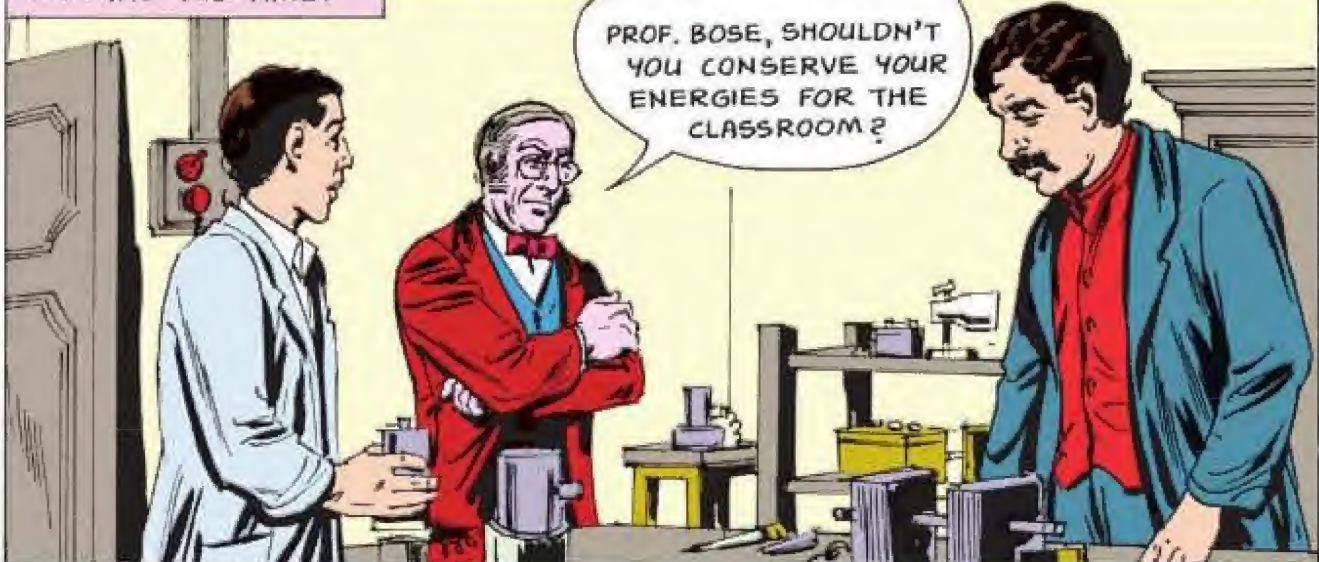
BOSE WAS GIVEN THE REVISED SCALE OF PAY WITH RETROSPECTIVE EFFECT.

IN THE NEXT FEW YEARS, BOSE SPENT MUCH OF HIS SPARE TIME IN THE COLLEGE LABORATORY. SPENDING HIS OWN MONEY AND USING HIS FINE ENGINEERING SKILL HE MADE MANY OF THE INSTRUMENTS HE NEEDED.

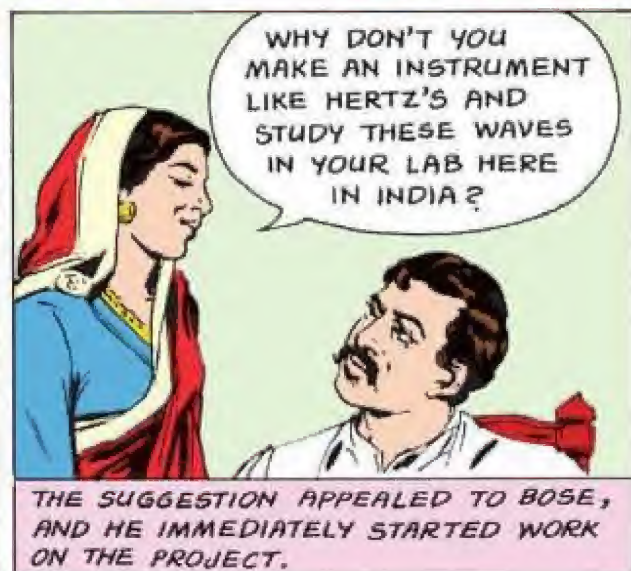
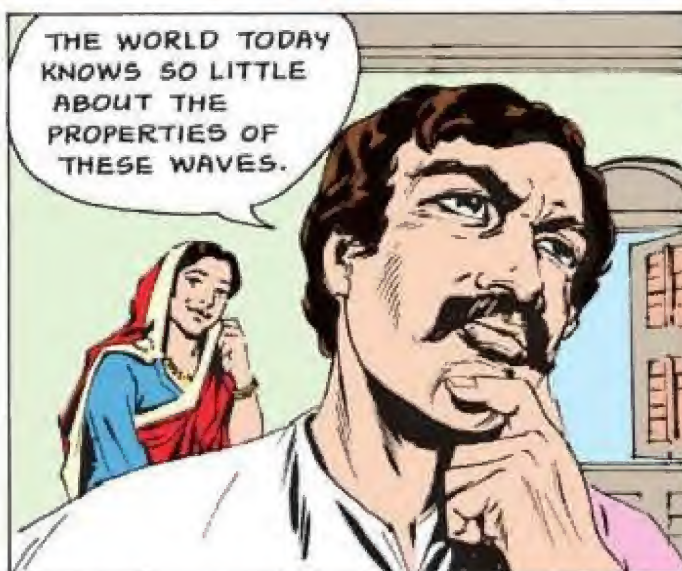
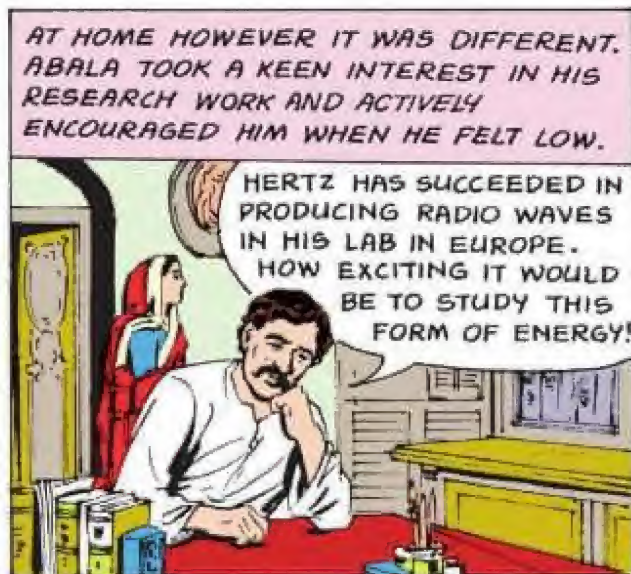
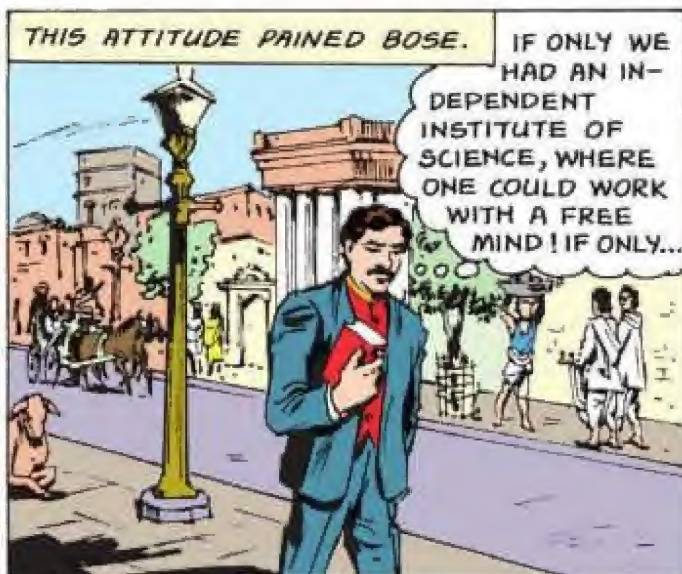


INSTEAD OF APPRECIATING HIS WORK THE COLLEGE AUTHORITIES FELT HE WAS WASTING HIS TIME.

PROF. BOSE, SHOULDN'T YOU CONSERVE YOUR ENERGIES FOR THE CLASSROOM?

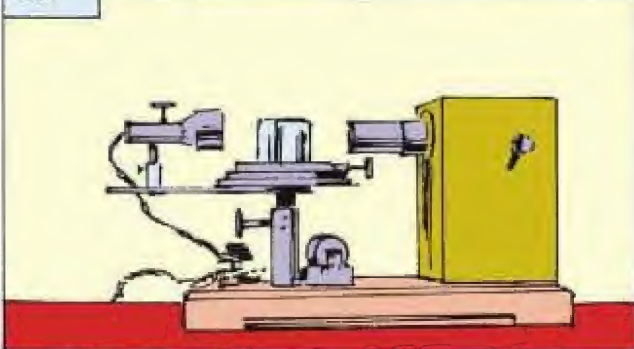






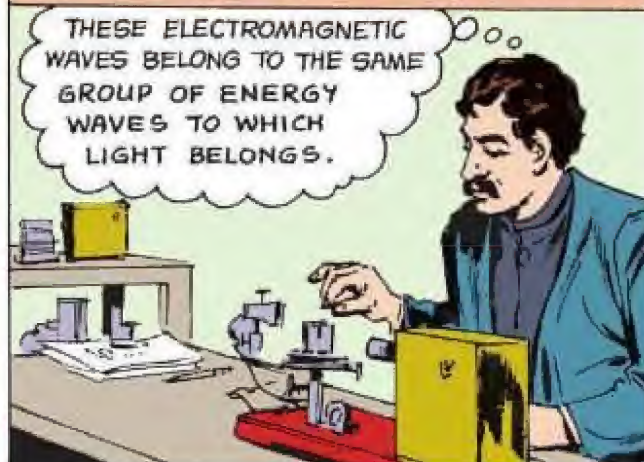


BOSE'S EQUIPMENT WAS A SCIENTIFIC MARVEL. THE COMPACT APPARATUS WAS MUCH SUPERIOR TO THE ONE MADE BY HERTZ. IT COULD PRODUCE RADIO WAVES OF VERY SHORT WAVELENGTHS WHICH NO OTHER APPARATUS COULD HITHERTO DO.



QUANTITATIVE EXPERIMENTS ON THE PROPERTIES OF THESE WAVES WERE NOW POSSIBLE FOR THE FIRST TIME.

THESE ELECTROMAGNETIC WAVES BELONG TO THE SAME GROUP OF ENERGY WAVES TO WHICH LIGHT BELONGS.

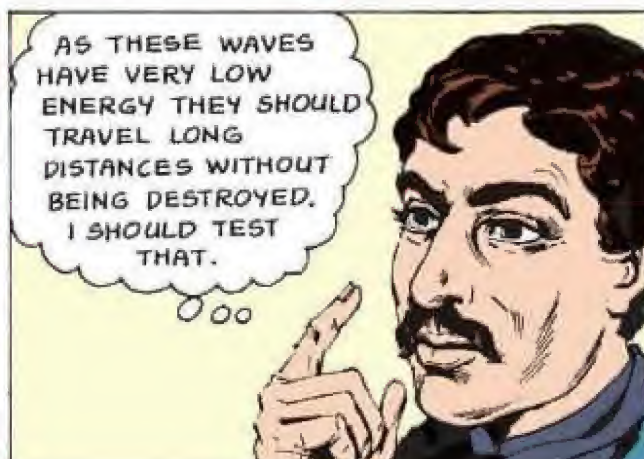


SO, LIKE LIGHT WAVES, IT MUST BE POSSIBLE TO POLARIZE RADIO WAVES TOO!



AND THUS BOSE DISCOVERED THE CRYSTAL NEMALITE WHICH COULD POLARIZE RADIO WAVES.

AS THESE WAVES HAVE VERY LOW ENERGY THEY SHOULD TRAVEL LONG DISTANCES WITHOUT BEING DESTROYED. I SHOULD TEST THAT.



HIS EXPERIMENTS ON THIS TOO GAVE HIM POSITIVE RESULTS

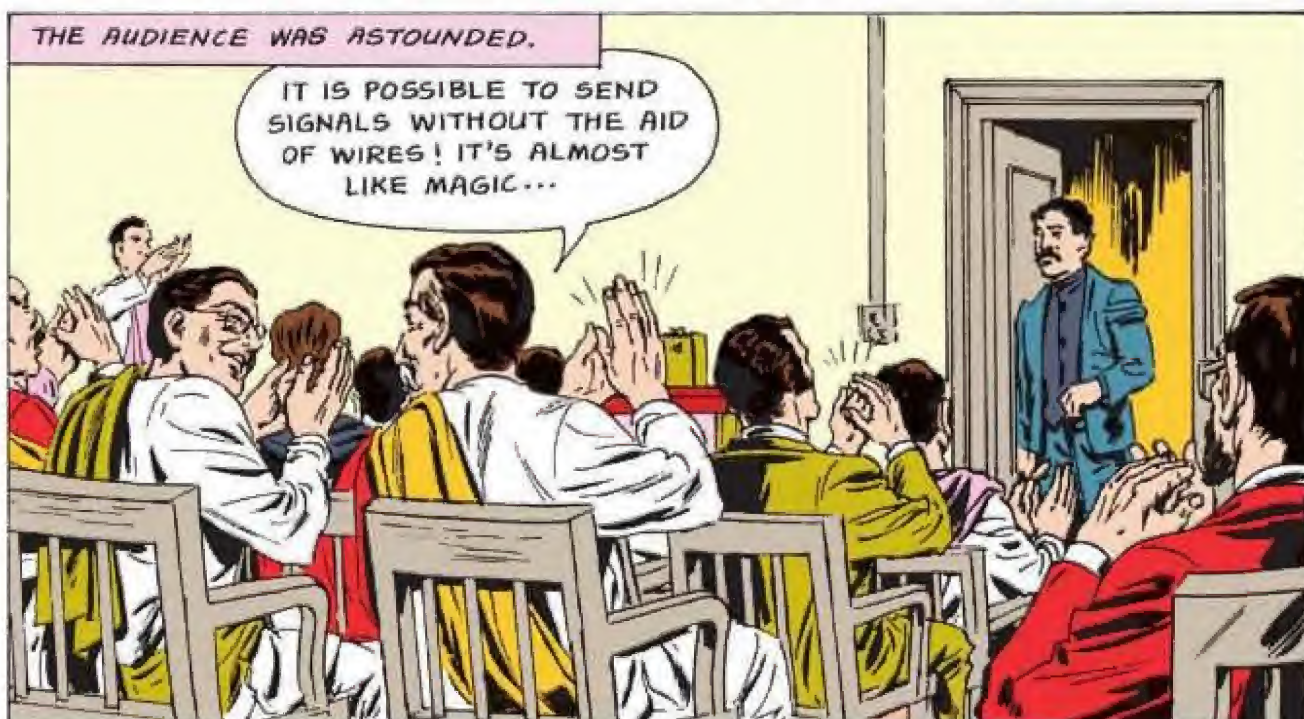
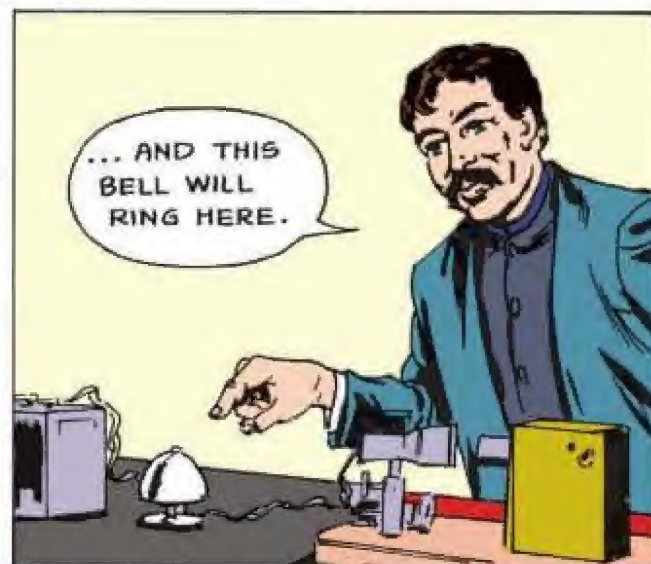
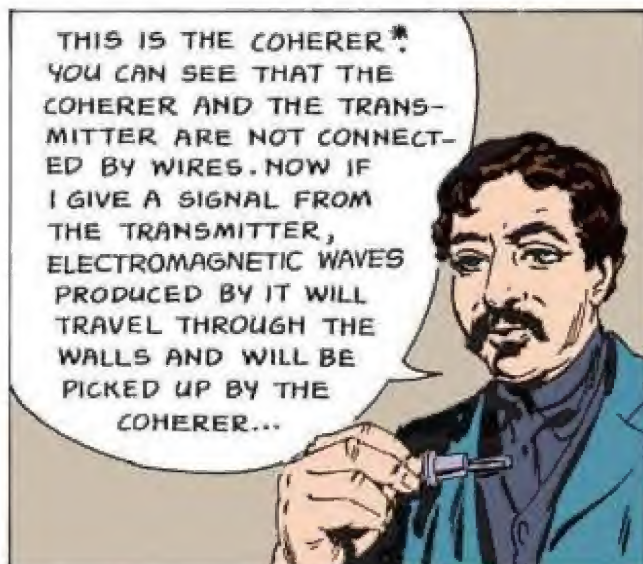
IN 1895 HE GAVE A PUBLIC DEMONSTRATION OF HIS DISCOVERIES IN CALCUTTA.

GENTLEMEN, I HAVE SHOWN YOU THE TRANSMITTER PLACED IN THE OTHER ROOM, 75 FEET AWAY FROM US.



\* ABOUT 23 METRES





\* RECEIVER.



BOSE WORKED LONG HOURS IN THE LABORATORY AND YET FOUND TIME TO HELP HIS WIFE IN THE KITCHEN.

THERE, ABALA ! ALL YOUR JARS NEATLY LABELLED AND ARRANGED !

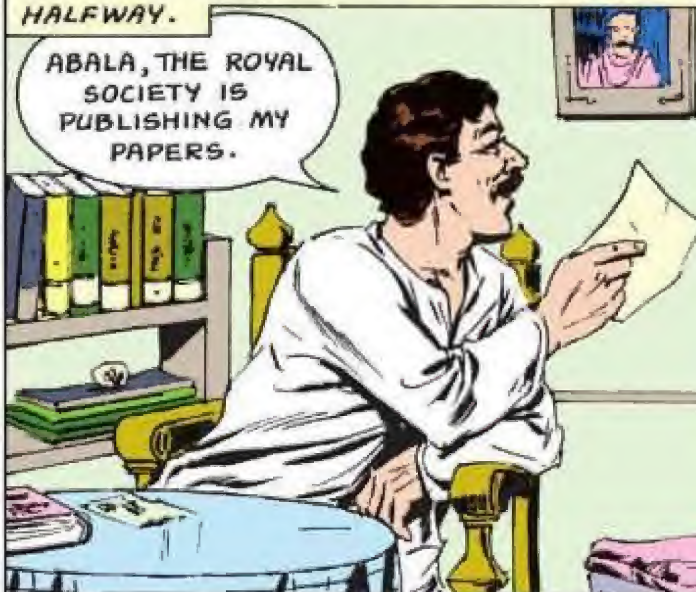


YOU JUST HAVE TO LOOK AT THE LABEL AND YOU GET WHAT YOU WANT.



BOSE STARTED WORK ON A PROJECT TO LINK HIS COLLEGE, A KILOMETRE AWAY, WITH HIS HOME BY RADIO. BUT A LETTER FROM THE ROYAL SOCIETY MADE HIM LEAVE IT HALFWAY.

ABALA, THE ROYAL SOCIETY IS PUBLISHING MY PAPERS.



THAT'S GREAT NEWS ! BUT I'M NOT SURPRISED.



I WISH I COULD MAKE A TRIP TO EUROPE AND OBSERVE THE WORK GOING ON THERE IN MY FIELD.



PERHAPS YOU COULD APPLY FOR SOME LEAVE AND PLAN A TRIP.



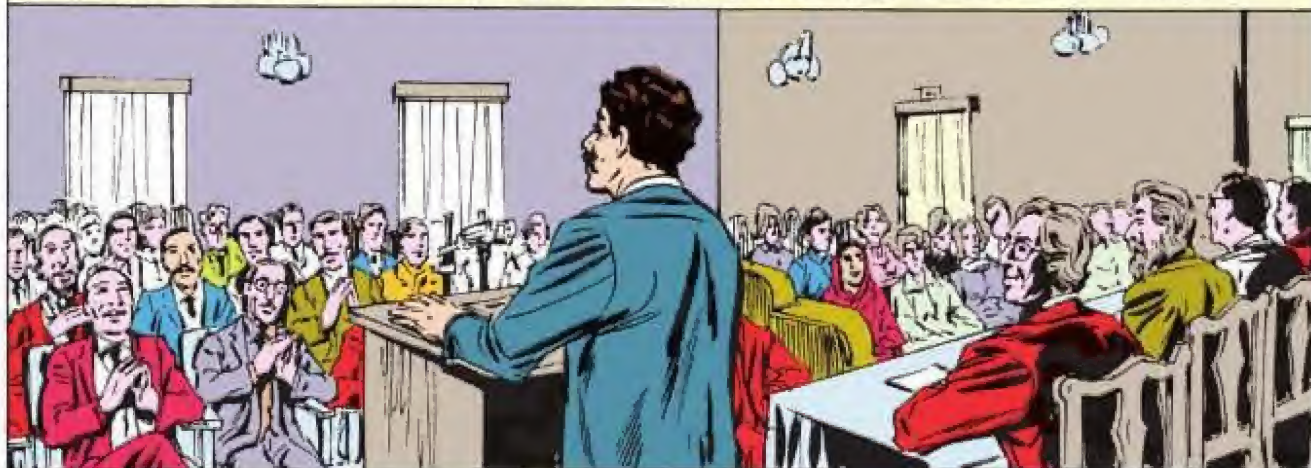


A FEW DAYS LATER, THE BRITISH ASSOCIATION OF SCIENTISTS INVITED BOSE TO SPEAK AT THEIR LIVERPOOL SESSION.

ABALA, I HAVE BEEN SANCTIONED SPECIAL LEAVE TO ATTEND THE SESSION. WE GO NEXT WEEK.



HIS TALK AT LIVERPOOL EARNED HIM THE ADMIRATION AND ESTEEM OF THE EMINENT SCIENTISTS FROM ALL OVER EUROPE WHO HAD ASSEMBLED THERE.



LORD KELVIN WAS SO IMPRESSED THAT HE LIMPED INTO THE LADIES' GALLERY TO CONGRATULATE ABALA.

CONGRATULATIONS, MRS. BOSE. YOUR HUSBAND IS A GENIUS. HE HAS MADE A GIANT STRIDE IN THE REALM OF PHYSICS.



BOSE WAS MUCH SOUGHT AFTER AND HEARD RESPECTFULLY BY THE SCIENTISTS OF EUROPE. NOT EVEN THE BRITISH PRESS, ALWAYS CYNICAL OF INDIANS, COULD WITHHOLD ITS ADMIRATION. THE GOVERNMENT AS A SPECIAL GESTURE EXTENDED HIS LEAVE TO ALLOW HIM TO STAY ON IN ENGLAND.



MANY FIRMS IN EUROPE OFFERED BOSE FABULOUS PRICES FOR THE EXCLUSIVE RIGHTS ON HIS APPARATUS. BUT BOSE REFUSED EVEN TO OBTAIN A PATENT FOR HIS DISCOVERY.

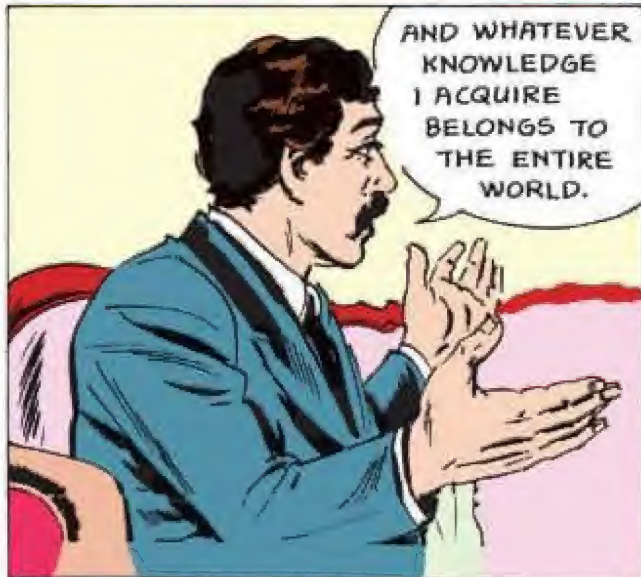
EVEN MY FRIENDS DON'T UNDERSTAND THE REASONS FOR MY REFUSAL.



ABALA, I AM A SEEKER OF KNOWLEDGE. NOT OF THE WEALTH OR FAME THAT KNOWLEDGE CAN BRING.



AND WHATEVER KNOWLEDGE I ACQUIRE BELONGS TO THE ENTIRE WORLD.



THE WEST MAY NOT REALISE THIS, BUT IT IS OUR DUTY TO SHOW THEM THE RIGHT PATH BY OUR STAND.

I FULLY AGREE WITH YOU.



BOSE RETURNED TO INDIA IN 1897 AND CONTINUED HIS RESEARCH ON ELECTROMAGNETIC WAVES.

MANY PROMINENT INDIANS SAW A KINDRED SPIRIT IN HIM AND CAME TO HIS AID. TAGORE WAS ONE OF THEM.

JAGADIS BABU, I AM HAPPY THAT YOU HAVE COME BACK TO INDIA.



I HAVE TALKED TO THE MAHARAJA OF TRIPURA AND HE HAS AGREED TO GIVE YOU A GRANT.



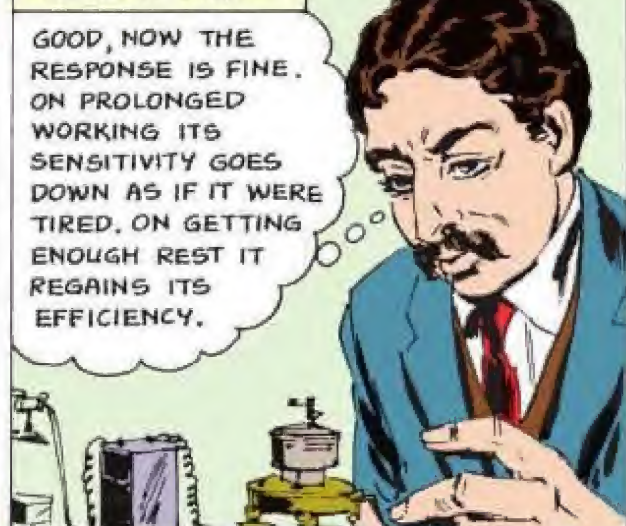


BOSE SPENT ALL HIS TIME ON HIS RESEARCH ON ELECTROMAGNETIC WAVES. ONE DAY —



OH, THE SAME PROBLEM AGAIN. THE RECEIVER HAS LOST ITS SENSITIVITY. NOW I WILL HAVE TO WAIT TILL MORNING TO CONTINUE THIS EXPERIMENT.

THE NEXT DAY —



GOOD, NOW THE RESPONSE IS FINE. ON PROLONGED WORKING ITS SENSITIVITY GOES DOWN AS IF IT WERE TIRED. ON GETTING ENOUGH REST IT REGAINS ITS EFFICIENCY.

IS IT POSSIBLE THAT LIKE LIVING BEINGS METALS ALSO HAVE FATIGUE? SOUNDS IMPOSSIBLE BUT THAT IS WHAT HAPPENS HERE. BESIDES, INDIAN PHILOSOPHY DOESN'T RULE OUT SUCH A POSSIBILITY.

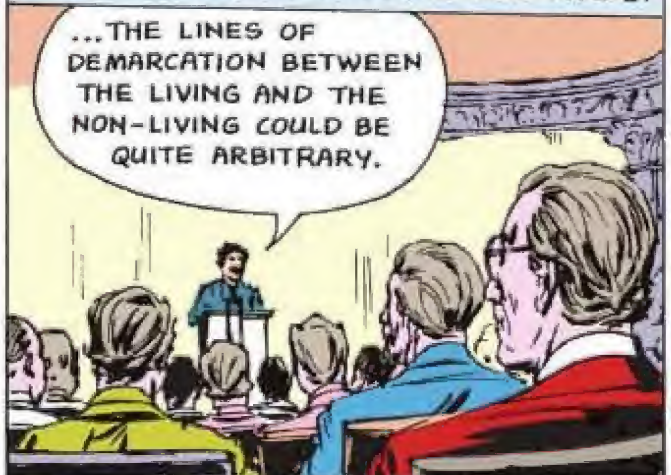


BOSE WAS THUS DRAWN INTO AN ALTOGETHER NEW FIELD OF INVESTIGATION. AND HE CAME UP WITH SOME STARTLING CONCLUSIONS.



HOW STRANGE. HOW COULD WE SEPARATE THE LIVING AND NON-LIVING MERELY ON PHYSICAL RESPONSE...

IN 1900 THE GOVERNMENT SENT BOSE TO ATTEND THE INTERNATIONAL CONFERENCE OF PHYSICISTS AT PARIS. THERE HE PRESENTED HIS NEW FINDINGS ON THE RESPONSE IN THE LIVING AND NON-LIVING.



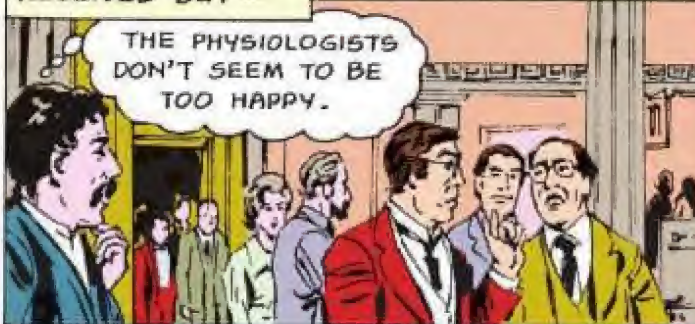
...THE LINES OF DEMARCATION BETWEEN THE LIVING AND THE NON-LIVING COULD BE QUITE ARBITRARY.



REMARKABLE! ONLY AN INDIAN MIND COULD HAVE COME UP WITH IT. THIS DISCOVERY IS GOING TO REVOLUTIONISE SCIENTIFIC THINKING ITSELF.



FROM PARIS BOSE WENT TO ENGLAND WHERE HE READ A SIMILAR PAPER BEFORE THE BRITISH ASSOCIATION. HERE TOO IT WAS WELL RECEIVED BUT —



THE PHYSIOLOGISTS DON'T SEEM TO BE TOO HAPPY.

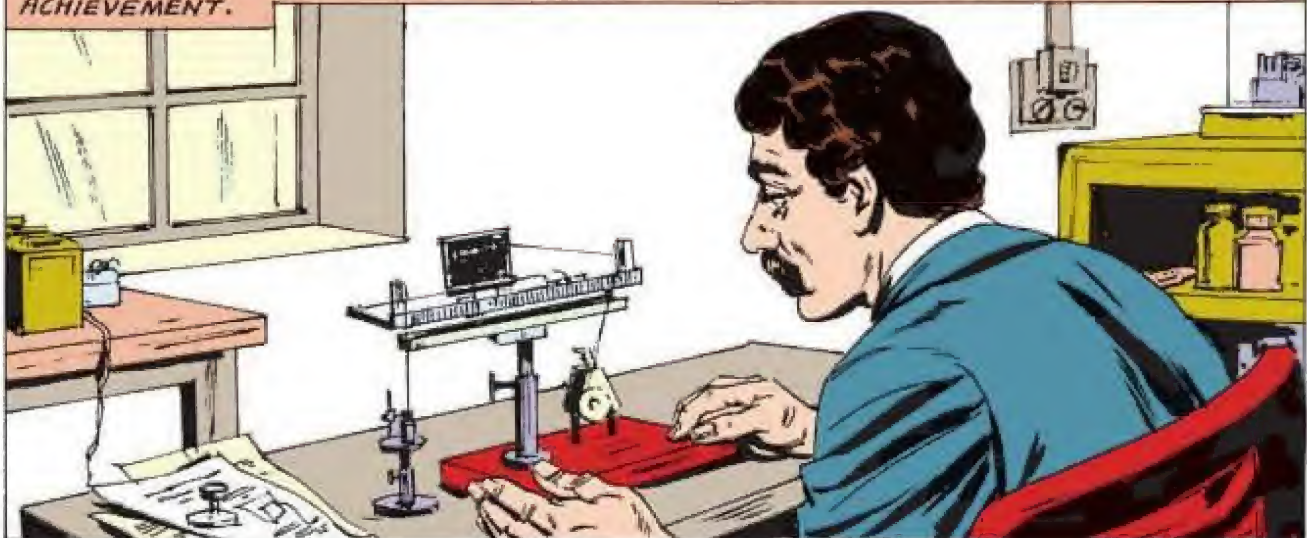
THE PHYSIOLOGISTS WERE NOT. THEY COULD NOT ACCEPT BOSE'S METHOD OF EXPERIMENTATION AS SUCH METHODS WERE NOT RECOGNISED BY THEM.

AT THE INVITATION OF LORD RALEIGH HE STAYED BACK IN LONDON TO DEVISE NEW TECHNIQUES.



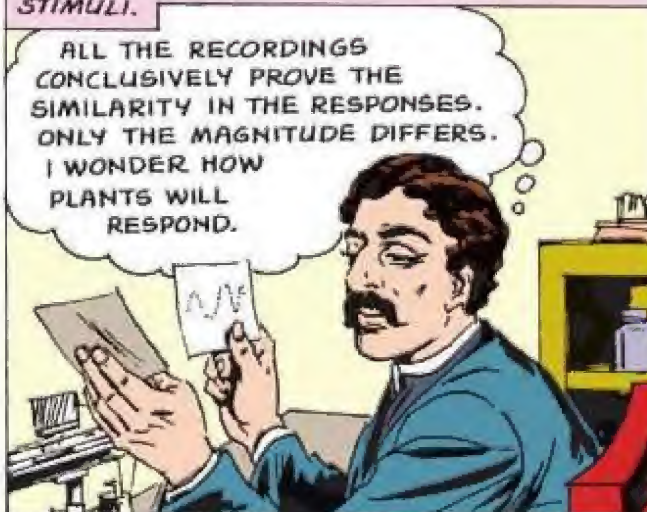
I MUST PERFECT AN INSTRUMENT TO RECORD MINUTE RESPONSES. THAT SHOULD BE MY FIRST JOB.

WHAT HE EVENTUALLY DESIGNED FOR THIS PURPOSE WAS THE CRESCOGRAPH WHICH COULD AMPLIFY ANY TINY SIGNAL TO MILLION TIMES. IT WAS A MAGNIFICENT ACHIEVEMENT.



BOSE RECORDED THE RESPONSES OF ANIMALS AND METALS TO DIFFERENT STIMULI.

ALL THE RECORDINGS CONCLUSIVELY PROVE THE SIMILARITY IN THE RESPONSES. ONLY THE MAGNITUDE DIFFERS. I WONDER HOW PLANTS WILL RESPOND.



HE RUSHED TO THE GARDEN AND COLLECTED SOME LEAVES.





ON TESTING THEM HE WAS ASTOUNDED.



PLANTS RESPOND ELECTRICALLY TO ALL KINDS OF IMPULSES, JUST AS ANIMALS RESPOND TO ALL TYPES OF IRRITATIONS.

ACCEPTANCE TO HIS REVOLUTIONARY IDEAS HOWEVER WAS SLOW TO COME.

ORDINARY PLANTS RESPONDING TO ELECTRIC STIMULI LIKE ANIMAL TISSUES. IMPOSSIBLE!



BUT BOSE DIDN'T GIVE UP. HIS PAINSTAKING WORK AND METICULOUSLY PLANNED EXPERIMENTS SLOWLY WON HIM RECOGNITION.

IN 1902 HE CONDUCTED A NUMBER OF EXPERIMENTS BEFORE THE LINNEAN SOCIETY GATHERING CONSISTING OF MOST OF HIS CRITICS. WHEN BOSE FINISHED HIS LECTURE —

CONGRATULATIONS DR. BOSE \*! ALL YOUR EXPERIMENTS ARE FLAWLESS.



THANK YOU, MR. PRESIDENT.

BOSE'S PIONEERING WORK HAD OPENED UP A NEW BRANCH IN NATURAL SCIENCE — BIOPHYSICS. STUDYING BIOLOGICAL PHENOMENA WITH THE METHODOLOGY OF PHYSICS, WITH ITS ACCURACY AND PRECISION, YIELDED A GREAT DEAL OF NEW INFORMATION ON THE MYSTERIES OF LIFE.

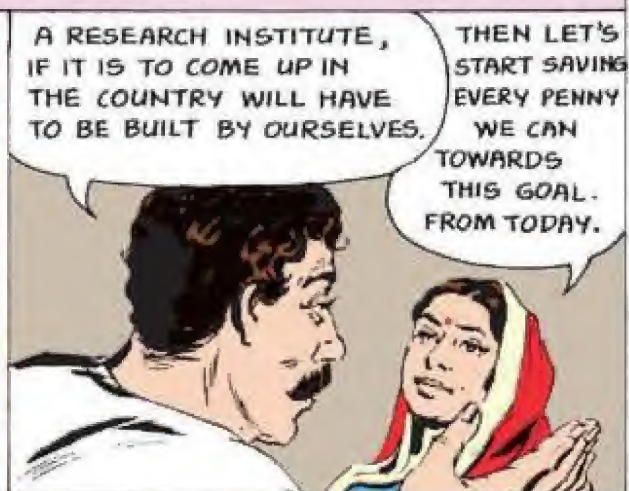
BOSE RETURNED TO INDIA IN TRIUMPH IN OCTOBER 1902. THE ROYAL SOCIETY HAD FINALLY PUBLISHED HIS PAPERS AND HIS DISCOVERIES HAD BEEN ACCEPTED ALL OVER THE WORLD.



\* LONDON UNIVERSITY HAD AWARDED HIM A DOCTORATE IN RECOGNITION OF HIS OUTSTANDING CONTRIBUTION.



BOSE RESUMED HIS DUTY AT PRESIDENCY COLLEGE. FOR ALL HIS SUCCESS AND FAME, HE STILL HAD TO STRUGGLE WITH AN ILL-EQUIPPED LABORATORY.



BOSE NOW DEVOTED ALL HIS TIME TO THE STUDY OF PLANTS. HIS DEVOTION TO HIS WORK WAS SO TOTAL THAT PEOPLE BELIEVED HE COULD EVEN CONVERSE WITH PLANTS.



IN THE MATTER OF A FEW YEARS HE FOUND OUT MORE ABOUT PLANTS THAN ANYONE BEFORE AND PERHAPS SINCE.



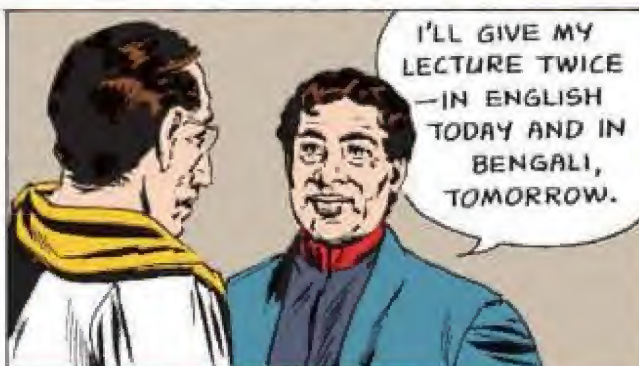
HE PUBLISHED HIS DISCOVERIES OF THIS PERIOD IN TWO OF THE MANY BOOKS HE WROTE.



THESE BOOKS CREATED GREAT INTEREST ABROAD AND HIS METHODS AND INSTRUMENTS BEGAN TO BE USED IN UNIVERSITIES ALL OVER THE WORLD.



DESPITE HIS BUSY SCHEDULE HE FOUND TIME TO GO ON LECTURE TOURS ALL OVER THE COUNTRY. ONCE AT MYMENSINGH THE CROWD THAT CAME TO HEAR HIM WAS MORE THAN THE HALL COULD CONTAIN.

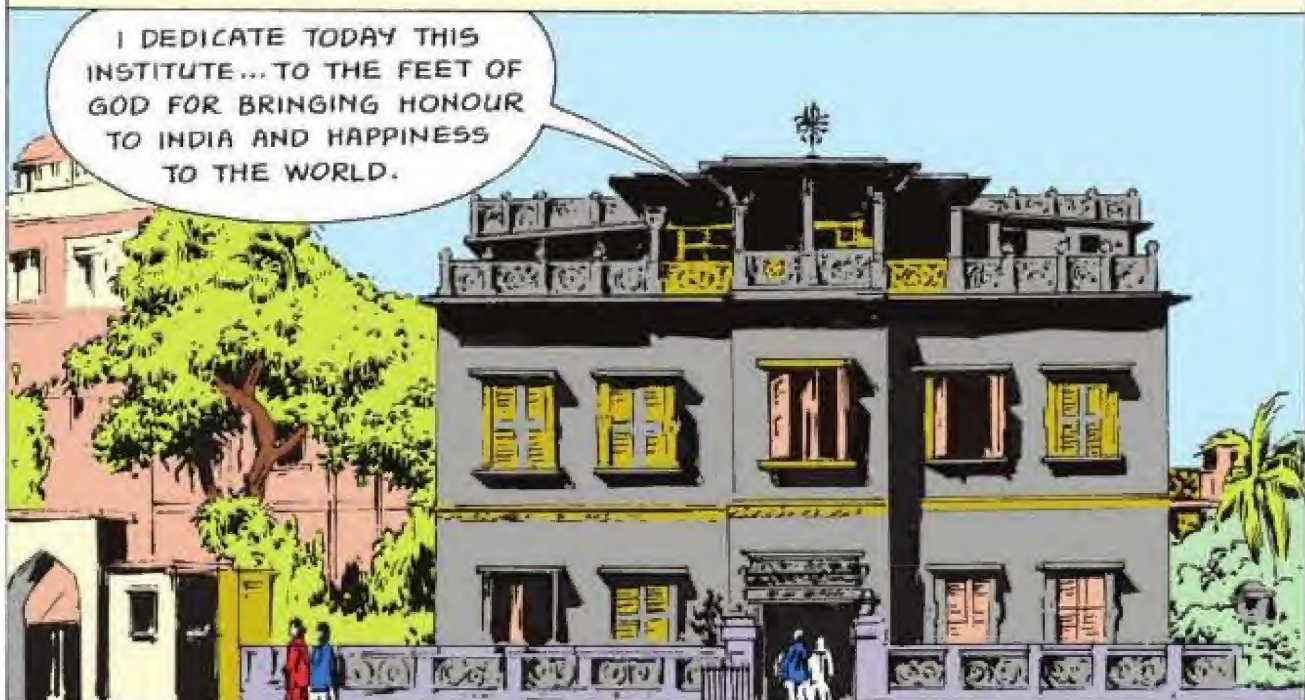


BOSE NEVER TRIED TO CAPITALISE ON HIS FAME OR HIS INVENTIONS.

HE RETIRED FROM SERVICE IN NOVEMBER 1915. HE WAS GAZETTED AS PROFESSOR EMERITUS AND WAS PAID A FULL SALARY INSTEAD OF A PENSION.



THE INSTITUTE WAS OPENED ON 30TH NOVEMBER, 1917 ON HIS 59TH BIRTHDAY.







... WELCOME TO ALL WHO SEEK KNOWLEDGE ... IT WILL BE OPEN TO PEOPLE FROM ALL OVER THE WORLD, TO MEN AND WOMEN ALIKE AND FOR ALL TIME TO COME.



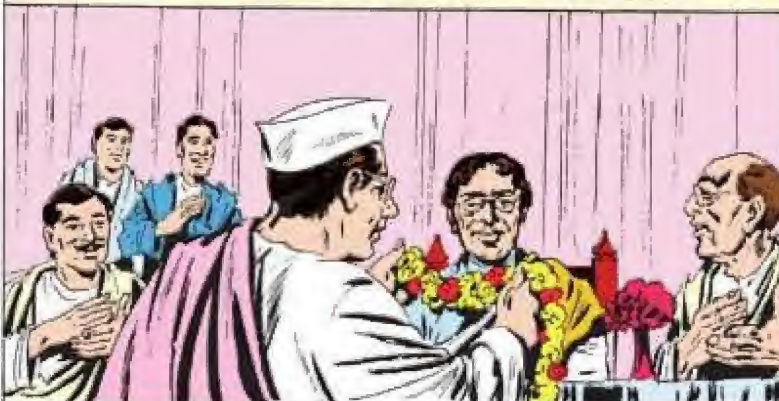
AS THE FOUNDER-DIRECTOR, BOSE WORKED AT THE BOSE RESEARCH INSTITUTE FOR THE REST OF HIS LIFE, GUIDING YOUNGSTERS IN RESEARCH.



HE PERFECTED A METHOD OF TRANSPLANTING FULL-GROWN TREES, BY SEDATING THEM.



ALL SORTS OF HONOURS CAME HIS WAY NOW. HE WAS KNIGHTED IN 1917. THREE YEARS LATER, HE WAS ELECTED A FELLOW OF THE ROYAL SOCIETY. AND IN 1931 THE CITIZENS OF CALCUTTA HONoured HIM AT A CIVIC RECEPTION. SUBHAS CHANDRA BOSE, THE THEN MAYOR OF CALCUTTA, HONoured THE SCIENTIST ON BEHALF OF THE CITIZENS.



THIS OUTSTANDING SCIENTIST DIED ON NOVEMBER 23, 1937. WHAT ENCYCLOPAEDIA BRITANNICA WROTE IN 1945 ABOUT HIM IS STILL VALID.

HIS WORK WAS SO MUCH IN ADVANCE OF HIS TIME THAT ITS PRECISE EVALUATION WAS NOT POSSIBLE.



IT DOES NOT SEEM POSSIBLE EVEN TODAY.



## WHICH OF THE ACKs HAVE YOU STILL NOT READ?

### EPICS AND MYTHOLOGY

*Best known stories from the Epics and the Puranas*

Abhimanyu  
Agastya  
Andhaka  
Aniruddha  
Aruni And Uttanka  
Ashwini Kumars  
Ayyappa  
Bahubali  
Bhanumati  
Bheema And Hanuman  
Bheeshma  
Chandrasekhar  
Dasharatha  
Dhruva And Ashtavakra  
Draupadi  
Drona  
Elephanta  
Gandhari  
Ganesha  
Ganesha And The Moon  
Ganga  
Garuda  
Ghatotkacha  
Hanuman  
Hanuman To The Rescue  
Harischandra  
Heroes Of Hampi  
Indra And Shachi  
Indra And Shibi  
Indra And Vritra  
Jagannatha Of Puri  
Jayadratha  
Kacha And Devayani  
Karna  
Kartikaya  
Konark  
Krishna  
Krishna And Jarasandha  
Krishna And Narakasura  
Krishna And Rukmini  
Krishna And Shishupala  
Krishna And The False  
Vaasudeva  
Kubera  
Kumbhakarna  
Mahabharata  
Mahiravana  
Nachiketa  
Nahusha  
Nala Damayanti  
Pareekshit  
Parashurama  
Prabhavati  
Pradyumna  
Pralad  
Purushottam Dev And  
Padmavati  
Rama  
Ravana Humbled  
Saraswati  
Sati And Shiva  
Savitri  
Shiva Parvati  
Stories Of Creation  
Subhadra  
Sudama  
Sukanya  
Surya  
Tales From The  
Upanishads  
Tales Of Arjuna  
Tales Of Balarama  
Tales Of Durga  
Tales Of Indra  
Tales Of Narada

Tales Of Shiva  
Tales Of Vishnu  
Tales Of Yudhishtira  
Tapati  
Thanjavur  
The Churning Of The  
Ocean  
The Gita  
The Golden Mongoose  
The King In  
A Parrot's Body  
The Lord Of Lanka  
The Pandava Princes  
The Pandavas In Hiding  
The Parijata Tree  
The Sons Of Rama  
The Syamantaka Gem  
Tirupati  
Tripura  
Uloopi  
Vaishno Devi  
Vallu  
Vishwamitra  
Yayati

### VISIONARIES

*Inspiring tales of thinkers,  
social reformers and  
nation builders*

Adi Shankara  
Albert Einstein  
Anant Pai  
Babasaheb Ambedkar  
Basaveshwara  
Buddha  
Chaitanya Mahaprabhu  
Chanakya  
Chokha Meis  
Dayananda  
Deshbandhu  
Chittaranjan Das  
Eknath  
Fa Hien  
Ghanshyamdas Birla  
Guru Arjan  
Guru Gobind Singh  
Guru Har Gobind  
Guru Nanak  
Guru Tegh Bahadur  
Hsien Tsang  
J.R.D. Tata  
Jagadis Chandra Bose  
Jamsetji Tata  
Jawaharlal Nehru  
Jayaprakash Narayan  
Jim Corbett  
Jnaneshwar  
Kabir  
Kalidasa  
Lal Bahadur Shastri  
Lokmanya Tilak  
M. S. Subbulakshmi  
Madhvacharya  
Mahavira  
Marie And Pierre Curie  
Megasthenes  
Mirabai  
Mother Teresa  
Narayan Guru  
Rabindranath Tagore  
Ram Shastri  
Ramana Maharshi  
Ramanuja  
Saim Ali  
Shankar Dev  
Soordas  
Sri. Ramakrishna  
Srinivasa Ramanujan  
Subramania Bharati

Swami Chinmayananda  
Swami Pranavananda  
Tales Of Sai Baba  
Tansen  
Tulsidas  
Vidyasagar  
Vivekananda  
Zarathushtra

### INDIAN CLASSICS

*Enchanting tales from  
Indian literature*

Ananda Math  
Ancestors Of Rama  
Devi Choudhurani  
Durgesh Nandini  
Kadambari  
Kannagi  
Kapala Kundala  
Kumanan  
Maarthaanda Varma  
Malavika  
Manonmani  
Prince Jivaka  
Raj Singh  
Ratnavali  
Shakuntala  
The Adventures Of  
Pratap  
The Elusive Kaka  
Udayana  
Urvashi  
Vasantasena  
Vasavadatta  
Veer Dhaval

### FABLES AND HUMOUR

*Evergreen folktales,  
legends and tales of  
wisdom and humour*

A Bag Of Gold Coins  
Amrapali  
Andher Nagari  
Angulimala  
Bikal The Terrible

### BIRBAL STORIES

Birbal The Clever  
Birbal The Genius  
Birbal The Just  
Birbal The Wise  
Birbal The Witty  
Birbal To The Rescue  
The Inimitable Birbal

Chandralalal  
Dhola And Maru  
Friends And Foes  
Gopal And The Cowherd  
Gopal The Jester

### HITOPADESHA TALES

Choice Of Friends  
How Friends Are Parted  
Hothal

### JATAKA TALES

Battle Of Wits  
Bird Stories  
Dear Stories  
Elephant Stories  
Jackal Stories  
Monkey Stories  
Nandi Vishala  
Stories Of Courage  
Stories Of Wisdom  
Tales Of Misers  
The Deadly Feast  
The Giant And  
The Dwarf  
The Hidden Treasure  
The Magic Chant

The Mouse Merchant  
True Friends  
Kanwal And Kehar  
Kesari The Flying Thief  
King Kusha  
Manduka

### PANCHATANTRA TALES

Crows And Owls  
How The Jackal Ate  
The Elephant  
The Brahmin And  
The Goat  
The Dullard  
The Greedy Mother-  
in-law  
The Jackal And  
The Wardrum  
Raman Of Tenali  
Raman The Matchless Wit  
Sahasramalla  
Sakshi Gopal  
Satwant Kaur  
Sharan Kaur  
Shrenik  
Sukhu And Dukhu  
Sundari  
Tales Of Maryada Rama  
The Acrobat  
The Adventures  
Of Agad Datta  
The Adventures Of  
Baddu And Chhotu  
The Bridegroom's Ring  
The Celestial Necklace  
The Clever Dancer  
The Cowherd Of Alawi  
The Fearless Boy  
The Fool's Disciples  
The Golden Sand  
The Green Demon  
The Unhappy Tiger  
The Learned Pandit  
The Lost Prince  
The Magic Grove  
The Miraculous Conch  
The Mystery Of  
The Missing Gift  
The Pandit And The  
Milkmaid  
The Pig And The Dog  
The Pious Cat  
The Priceless Gem  
The Prince And  
The Magician  
The Prophecy  
The Queen's Necklace  
The Rainbow Prince  
The Secret Of The  
Talking Bird  
The Silent Teacher  
The Tiger And The  
Woodpecker  
The Tiger Eater  
Thugson  
Vidyut Chora  
Vikramaditya's Throne

### BRAVEHEARTS

*Stirring tales of brave men  
and women of India*

A Nation Awakes  
Ahilyabai Holkar  
Ajantashatru  
Akbar  
Amar Singh Rathor  
Ashoka  
Babur  
Bagha Jatin  
Bajirao I

Baladitya And  
Yashodharma  
Balban  
Banda Bahadur  
Bappa Rawal  
Beni Madho And Pir Ali  
Bhagat Singh  
Bidhi Chand  
Bimbisara  
Chand Bibi  
Chandra Shekhar Azad  
Chandragupta Maurya  
Chennamma Of Keladi  
Dara Shukho And  
Aurangzeb  
Durgadas  
Elora Caves  
Hakka And Bukka  
Hari Singh Nalwa  
Harsha  
Hemu  
Humayun  
Jahangir  
Jallianwala Bagh  
Kalpana Chawla  
Kochunni  
Krishnadeva Raya  
Kurwar Singh  
Lachit Barphukan  
Laladitya  
Mangal Pande  
Noor Jahan  
Padmini  
Panna And Hadi Rani  
Paurava And Alexander  
Prithviraj Chauhan  
Raja Bhoja  
Raja Raja Chola  
Rana Kumbha  
Rana Pratap  
Rana Sanga  
Rani Abbakka  
Rani Durgavati  
Rani Of Jhansi  
Ranjit Singh  
Rash Bihari Bose  
Roopmati  
Sambhaji  
Samudra Gupta  
Sea Route To India  
Shah Jahan  
Shalivahana  
Shantala  
Sher Shah  
Shivaji  
Subhas Chandra Bose  
Sultana Razia  
Surjya Sen  
Tachcholi Othenan  
Tales Of Shivaji  
Tanaji  
Tenzing Norgay  
The Historic City Of Delhi  
The Rani Of Kittur  
Tipu Sultan  
Veer Hammir  
Veer Savarkar  
Velu Thampi  
Vikramaditya

### CONTEMPORARY CLASSICS

*(New Category)*

*The best of modern  
Indian literature*

The Blue Umbrella



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